

Development of Novel, Optically-Based Instrumentation for Aircraft System Testing and Control, Phase II

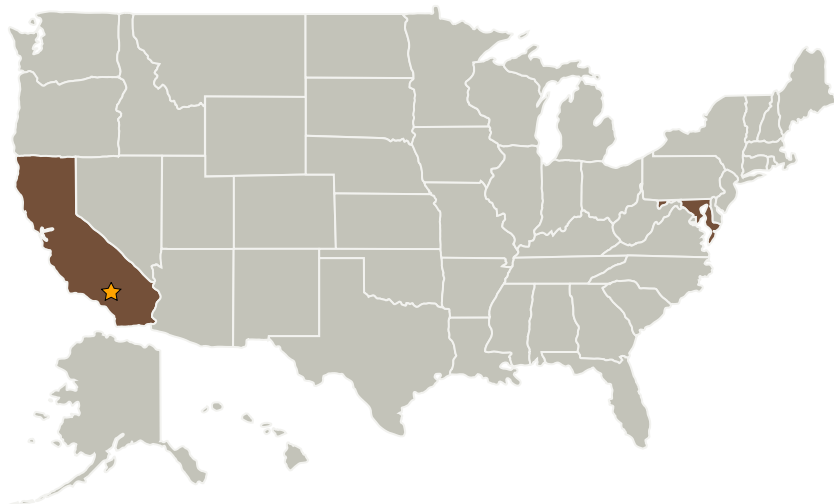
Completed Technology Project (2008 - 2011)



Project Introduction

We propose to design, build and evaluate a prototype of a compact, robust, optically-based sensor for making temperature and multi-species concentration measurements in propulsion system ground and flight test environments. This system will utilize a widely tunable near infrared light source to make absorption measurements of combustion reactant and products in the combustion zone (with accuracy from 100-1000 ppm). Although possible to tune over a very wide wavelength range, during phase-II we propose to develop the light source which will be able to continuously tune from 1.4 to 1.8 microns while maintaining a narrow bandwidth of 0.01 cm⁻¹ using a novel combination of acousto- and electro-optically controlled devices. The rapid tunability of this light source will obviate the need for dense multiplexing of multiple wavelengths as signals can be multiplexed in time while maintaining fast temporal response. Furthermore, the wide spectral bandwidth allows for the selection of the optimum absorption transitions, without regard for the commercial availability of narrow bandwidth diode lasers. The proposed instrumentation will be environmentally rugged, with the ability to withstand extreme ranges of temperature, humidity, vibration and shock conditions. Further, the system will possess auto-calibration capabilities, fast response time (few microseconds) and can be battery operated.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
★Armstrong Flight Research Center(AFRC)	Lead Organization	NASA Center	Edwards, California
Brimrose Corporation of America	Supporting Organization	Industry	Sparks, Maryland

Primary U.S. Work Locations	
California	Maryland

Project Transitions

 **April 2008:** Project Start

 **May 2011:** Closed out

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Armstrong Flight Research Center (AFRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX10 Autonomous Systems
 - ↳ TX10.2 Reasoning and Acting
 - ↳ TX10.2.6 Fault Response